CR-109169

p.24

PROJECT MANAGEMENT AS A TRANSFERABLE MANAGEMENT SYSTEM

Working Paper No. 21

David L. Wilemon

Syracuse University

[redacted] The research for this paper was supported by a NASA Research Grant #NGL 33-022-090 to investigate the "Role of the Apollo Project Manager."

Revised October, 1969

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PROJECT MANAGEMENT AS A TRANSFERABLE MANAGEMENT SYSTEM

Introduction

Since its inception, there has been considerable conjecture on the potential scientific and technological spin-offs from the Apollo Program to the public sector. To aid in the dissemination process, NASA established a technology utilization program. Most discussions on spin-offs and transfers to date have centered around these technological areas, i.e., new processes, new products, and new ideas. Although NASA's technology utilization program has met some success, there are those within and external to the agency who have been somewhat disappointed with the results achieved to date. Some individuals are now beginning to believe that, perhaps, NASA's greatest spin-off will be the agency's project management systems -- the sophisticated techniques utilized in planning, organizing, and controlling complex undertakings. A recent article, for example, stated:

> The really significant fallout from the strains, traumas, and endless experimentation of Project Apollo has been of a sociological rather than a technological nature: techniques for directing the massed endeavors of scores of thousands of minds in a close-knit mutually enhancive combination of government, university and private industry.[1]

The article furthers this notion by stating this ability "is potentially the most powerful tool in man's history."[2]

Within this framework, this article has one primary objective: to discuss the transfer of project management techniques in a generalized way to the "sociotechnical" areas, i.e., urban redevelopment, housing, pollution control, and international economic development

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[1]Tom Alexander, "The Unexpected Payoff of Project Apollo," Fortune, July, 1969, p. 114.

[2]Ibid.

projects. The term "sociotechnical" is used since most of these problem areas have both social and technical dimensions. That is, both social and technical management skills will be needed for effective problem resolution.

Some Emerging Schools of Thought

The demand coming from the public sector and especially the agencies concerned with the management of various public programs is that new management approaches are urgently needed. In the sociotechnical areas there is a complexity and interrelatedness of social and technical variables which require new management perspectives. In short, the traditional ways of managing many of our governmental programs in the public sector seem hopelessly outdated. There is disagreement, however, as to what alternative or supplementary management approaches would be most effective.

In the case of project management, there is considerable controversy developing whether these techniques are applicable to other areas -- especially to our sociotechnical problems. Some observers currently believe that project management and management systems are transferable. The whole subject, at best, is controversial with a wide range of opinions. Without attempting to over-simplify the taxonomics, one can delineate at least three emerging "schools of thought" in connection with the generic or transferable qualities of project management. These schools can be identified as the negativists, the transfer advocates, and the conservatists.

The Negativists

This school is composed to two basic groups with rather pessimistic

about the transfer of space-age management techniques. The first group believes that there are little or no spin-off potentialities in the space age management techniques. The disparity between technological and sociotechnical task management, according to them, is too great. In effect, they see little relevance between the two types of problem areas. These are the individuals saying - "Don't try it -- technology management and sociotechnical management require entirely different management approaches."

The second group in the "negativist school" believe that the success of space age management techniques has been based primarily on a rather autocratic, forceful and basically a non-participative management basis. For this reason, they believe that these new management techniques can have little application in the sensitive sociotechnical areas. The fear, in part, that their use could evolve into some kind of "autocratic mechanism" that might potentially violate certain basic political freedoms within society. In effect these individuals believe that these sophisticated management approaches could place management mechanisms in positions that could "dictate" to individuals their social and economic needs.

The negativists, then, view the "social phenomena" existing in the sociotechnical areas as too complex and/or too "sacred" to be managed in the same manner as the technical areas have been administered. It would be dangerous to dismiss too lightly the arguments the negativists have developed. This group has several sound arguments which must be addressed, i.e., the sanctity of our "social values;" the importance of "cultural continuity;" and participative social problem-solving.

Transfer Advocates

The second school believes that there are real and definite potentialities in the transfer of these new management approaches. Many in this grouping will articulate that there is almost a direct transfer of management technique from the hardware area to other social problems. These are the ones beginning to ask NASA and the aerospace industry for their "management secrets."

Although one may classify this group as the transfer advocates -- perhaps some of them should really be given the title -- the pessimistic optimists. These are the ones frequently heard remarking:

> "If NASA management techniques can put men on the moon, why can't they help solve our urban transportation problems?"
>
> "If NASA can place men in orbit, why then, can't we solve our pollution and stagnation problems?"

Comments such as these are really directed at man's inability to solve pressing social problems, not about the contribution that space age management experiences can or could make. This group believes that there are important applications that can be made, however, they are anxious for the transfer to be effected.

The Conservatists

The third group believes that some promise lies in the application of these new management approaches to the sociotechnical areas. They demand to take a rather cautious approach in evaluating the transfer -- in essence many desire to view the process via a true "scientific perspective". They want to move slowly and cautiously to delineate what parts of these new management techniques are applicable to other areas.

The author's own position lies somewhere within the range of the conservative school. Even though the author does not completely subscribe to the theorem of "what's good for NASA is also good for societies' other problems," the potentialities of effective systems management to other areas appears promising.

Some Basic Policy Issues

As previously alluded, the implementation of project management as an approach to deal with societal problems will in some cases be controversial. Most of the controversy will probably center around the applications of project management where the system might deal with programs of direct people-to-people interfacing, for example, family planning programs, employment and skill training, consumer programs, crime prevention programs, urban relocation programs and family medical and legal services. It is not advocated here that the basic function of project management is to achieve political or moral results. It is advocated, however, that project management may make programs which are desired by society more effective and efficient than they have been in the past. If society desires various sociotechnical programs, why then should they not be operated to obtain the objectives established for them?

Other areas where there is perhaps less controversy in the applications of project management are in the areas of oceanography, pollution control, and mass transportation programs. These areas for the most part tend to have much lower degrees of controversy. Few say that we should not control pollution and most advocate the desirability of having some strong, centralized operation to enforce and coordinate the various public

agencies, governments, and industries concerned with pollution abatement. Much the same can also be said for oceanography and mass transportation. Other applications where little controversy is likely to exist are in the areas of managing various projects within an agency, i.e., the management of new project research and development activities within an agency. Consider the following as an example where project management is used internally with an agency.

> Agency X establishes a research and development operation to conceptualize and develop a program for eliminating malnutrition among pre-school children. The project manager has the responsibility for developing and staffing the program. He draws from a "pool of talent" within the agency and places on his team a nutritionist, a sociologist and an economist. During the life of the project, the project manager can muster the best talent available for problem resolution. Once a viable program is developed then the project team will be disbanded.

It is strongly advocated that if project management can provide various positive strengths in the way of effective management, it should be utilized. Perhaps a conservative go-slow approach should be advocated in those areas where a high degree of controversy might exist. Perhaps the most important factor is to have several alternative management approaches articulated so that the most efficient and effective ones can be identified, discussed, and evaluated. Churchman agrees that this may be the best approach to follow:

> Now, it is sheer nonsense to expect that any human being has yet been able to attain such insight into the problems of society that he can really identify the central problems and determine how they should be solved. The systems in which we live are far too complicated as yet for our intellectual powers and technology to understand. Given the limited scope of our capability to solve the social problems we face, we have every right to question whether any approach -- systems approach, humanist approach, artist's approach, engineering approach, religious approach, psychoanalytic approach -- is the correct approach to the understanding of our society.

> But a great deal can be learned by allowing a clear statement of an approach to be made in order that its opponents may therefore state their opposition in as cogent a fashion as possible.[3]

Comparing Technical to Sociotechnical Task Management

To further explore the relevancy of the application of space-age management techniques to other problem areas, it may be advisable to take two brief examples for purposes of generalizing some underlying patterns in the sociotechnical area. It seems appropriate that the "city" and the current reorganization of the Office of Economic Opportunity make excellent examples for our purposes.

The City as a Case

Dr. Paine at the recent National Conference on Public Administration, discussed the similarities and differences between NASA and the city.[4] By taking the liberty to either paraphrase or quote several of Dr. Paine's key points comparing NASA to the city; some of the basic similarities and differences of each management problem can be identified.

Similarities between NASA and the City:

1. Both NASA and the city are large, complex, and expensive systems.
2. Both entail the integration of diverse groups and institutions.
3. Both serve as systems for integrating and finding resolution to a multitude of problems.

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[3]C. West Churchman, The Systems Approach, New York: Dell Publishing Company, 1968, pp. x-xi.

[4]Dr. Thomas O. Paine, "The Relevance to Cities of Space Age Systems Management;" speech presented at the National Conference on Public Administration, Miami Beach, Florida, May 20, 1969.

4. Both are entities that survive on public support.

5. Both NASA and the city are human enterprises.

6. Both are affected by the process of change.[5]

Differences between NASA and the Cities:

1. NASA's objectives are rather specific and they are measurable. By contrast, the goals of the city are not always measurable. Many goals of the city are either unworkable or not specified in any operable way.

2. NASA's objectives are formulated and carried out against "natural laws which are both rational, systematic and understood." "Cities... have their report card marked against wobbly human standards involving prejudice, special interest, wishful thinking, conflicting values, prophecy and revelation..." In essence, there are differences in operating and problem solving in a physical and a social environment.

3. For the most part NASA can choose its participants -- the city by contrast, cannot choose its participants.[6]

It is not difficult to accept the thesis that major differences between the tasks of our pressing sociotechnical problems and NASA's tasks are the focusing on people rather than on technology and things. As one interested observer commented:

> ...Already there are protests against thinking of social problems as engineering tasks or in terms of technological models. True enough, human welfare is the objective, and the customs, the values, and even the idiosyncrasies and

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[5] Ibid., pp. 1-2
[6] Ibid., pp. 2-4

> prejudices of man must influence means as well as ends. But the social programs, like the space program, call for management structures linking government, industry, and universities. The new programs will involve research, planning, coordination, and testing. And they will be bothered by multiple divisions of responsibility, conflicting ambitions and interest, decisions to use existing facilities or to assemble new ones, multiple channels of communication and authority, and the problem of building up and of phasing down as priorities shift to new targets or as new opportunities open up.[7]

As Dr. Paine's comparisons illustrate there are many areas of critical divergence between NASA and the city, however, there also are many areas of convergence. As further investigations uncover specific problem areas within the city that can be projectized, one will be able to see even more significant areas of comparability. It is in such areas where management specialists should look for the transfer potentialities.

The O.E.O. in Transition

In the discussions so far, it is hoped that the reader has not been given the impression that other agencies outside NASA and the DOD have not employed project management techniques. Slowly the "seeds of implementation" are being transferred to other agencies. The following section discusses the Office of Economic Opportunity (O.E.O.) as a case in point.

As many are aware, the O.E.O. currently is being reorganized with the objective of making it both a more efficient and effective organization. And most are aware of the fumbling and poor management found in

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[7]Dael Wolfle, "The Administration of NASA," Science, November 15, 1968, (editorial comment).

many of the O.E.O. programs. In discussing our governmental welfare programs President Nixon stated, "nowhere has the failure of government been more tragically apparent than in its efforts to help the poor, and especially in its system of public welfare."[8] In Nixon's address to the nation on August 8, 1969, he advocated a number of "structural reforms", for administering many of O.E.O.'s programs. The purpose of his address was described as follows:

> "(To) Present a new set of reforms -- a new set of proposals -- a new and drastically different approach to the way in which government cares for those in need, and to the way the responsibilities are shared between the State and Federal Governments."[9]

In the same address regarding the projected role for O.E.O., President Nixon stated:

> This administration has completed a thorough study of the O.E.O. We have assigned it a leading role in the effort to develop and test new approaches to the solving of social problems. The O.E.O. is to be a laboratory agency where new ideas for helping people are tried on a pilot basis. And when they prove successful, they can be "spun-off" to operating departments or agencies -- just as the space agency, for example, "spun-off" the weather satellite and the communication satellite when these proved successful. Then, the O.E.O. will be free to concentrate on breaking newer gound."[10]

In further emphasizing the new role for O.E.O., President Nixon remarked that the reorganization "will stress accountability, a clear separation of function, a tighter more effective organization of field operation."[11] . . . These steps are interpreted as a pioneering effort to implement to some degree a project management philosophy in the O.E.O.

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[8]President Richard M. Nixon's Address to the Nation, August 8, 1969.
[9]Ibid.
[10]Ibid.
[11]Ibid.

In the past, the O.E.O. has suffered from both role ambiguities and role overloads. In describing the chaotic situation, President Nixon noted:

> Too often the lines of responsibility in O.E.O. programs have been badly blurred; too often there has been no method for determining whether a program has succeeded or failed and what is responsible for failure and success. Too often the same individuals or groups, at both the national and local level, have found themselves wearing many hats: coordinating old programs, doing new research, setting up demonstration projects, evaluating results, and serving as advocates before the government on behalf of the poor. Precisely because each of these functions is important, each should be assigned to specific offices wherever that is possible, and they, in turn, should be held strictly accountable for the way in which their work is performed.[12]

In short, the reorganization of the O.E.O. is aiming for more effective management -- through teamwork.

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[12]"Statement by the President on the Office of Economic Opportunity," Office of the White House Press Secretary, San Clemente, California, August 11, 1969, p. 3.

Projected Organizational Designs

One area frequently ignored in discussions on the transferability of project management is the alternative methods of models that can be utilized. In the following paragraphs three alternative approaches will be briefly discussed. The specific organizational design quite naturally should be dictated by the problem to be solved and the scope of the problem. In short, the problem determines how the project organization will interface with the involved organization(s). There can be almost as many organizational designs as there are problem areas, however, the following appear to encompass the basic design principles of most project management organizations.

Internal Functional Model

This proposed arrangement for project management (see Figure 1) would most likely be employed when a project is undertaken internally within an agency. A project or several project offices are established and each office draws upon a "pool of talent" from the various functional departments within the agency. This approach has the advantage of integrating high calibre talent into the project group. Many project phase-down problems are eliminated since members of the project team can be returned to their functional organizations once the project is terminated or their own task is completed. Generally the project manager in the internal functional model would have direct authority over his project team. In Figure 1, the project manager would utilize project team members ($^{F}A'$ and $^{F}D'$) from the agencies' functional areas (FA) and (FD). A potential wide-spread use of this model would be in the management of sociotechnical research and development programs within the agency.

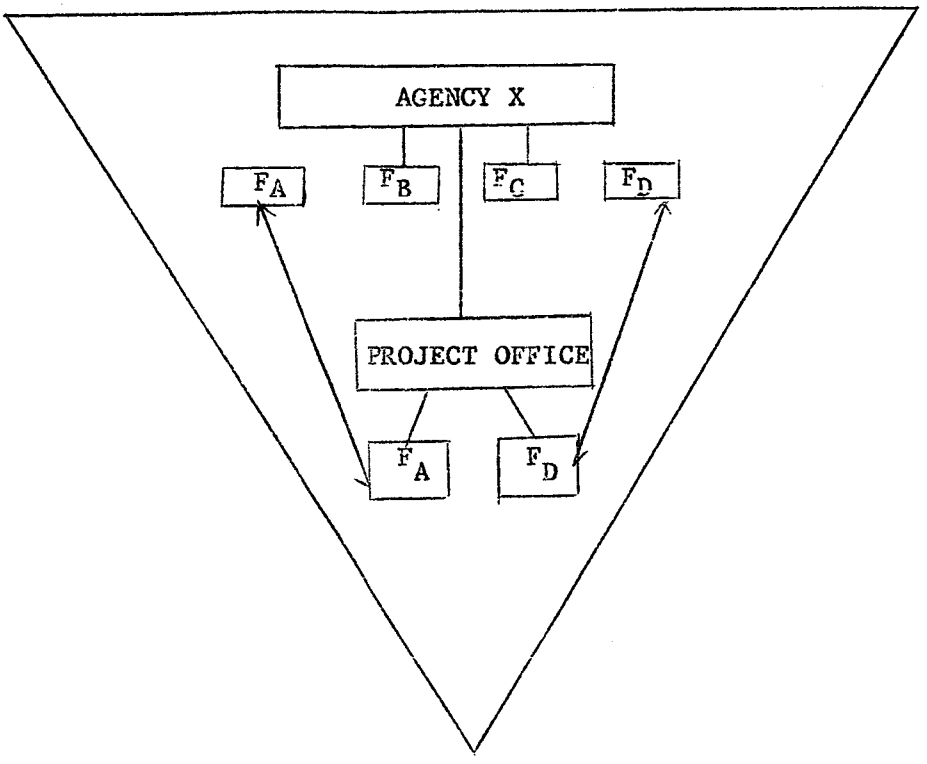

Figure 1 -- Internal Functional Model

Matrix Model

The matrix model is an adaptation of the project organization so widely and successfully used in the aerospace industry. In Figure 2, a program office receives a charter to operate and is delegated the "authority" to meet the program objectives. Next, the program office delineates its objectives into various projects. The relationship of Project "X" is shown to other involved governmental agencies as illustrated in Figure 2. Depending upon the charter given to the project manager he may or may not have direct authority over the participants in Agency A, B, and C. Perhaps the most logical arrangement would allow the project manager of project X to have authority over the project team head in each agency but not direct authority over the working participants on each team in the involved agency.

The matrix model would be most useful in the intra-coordination of several governmental agencies. Little needs to be said regarding the management advantages of this approach over many of the current hit-or-miss intra-agency coordination efforts.

Project Management via Contractor Support

The final organizational model is illustrated in Fugure 3. This model might be used by operating as a funding organization and possibly the initial program developer and planner. Responsibility for the actual operation of the program is contracted out to other organizations, for example, private industry in urban redevelopment. Once the project is contracted out, the project office would perform the critical role of planner, monitor, and coordinator. This model could allow the maximum participation by both government and private industry. In addition,

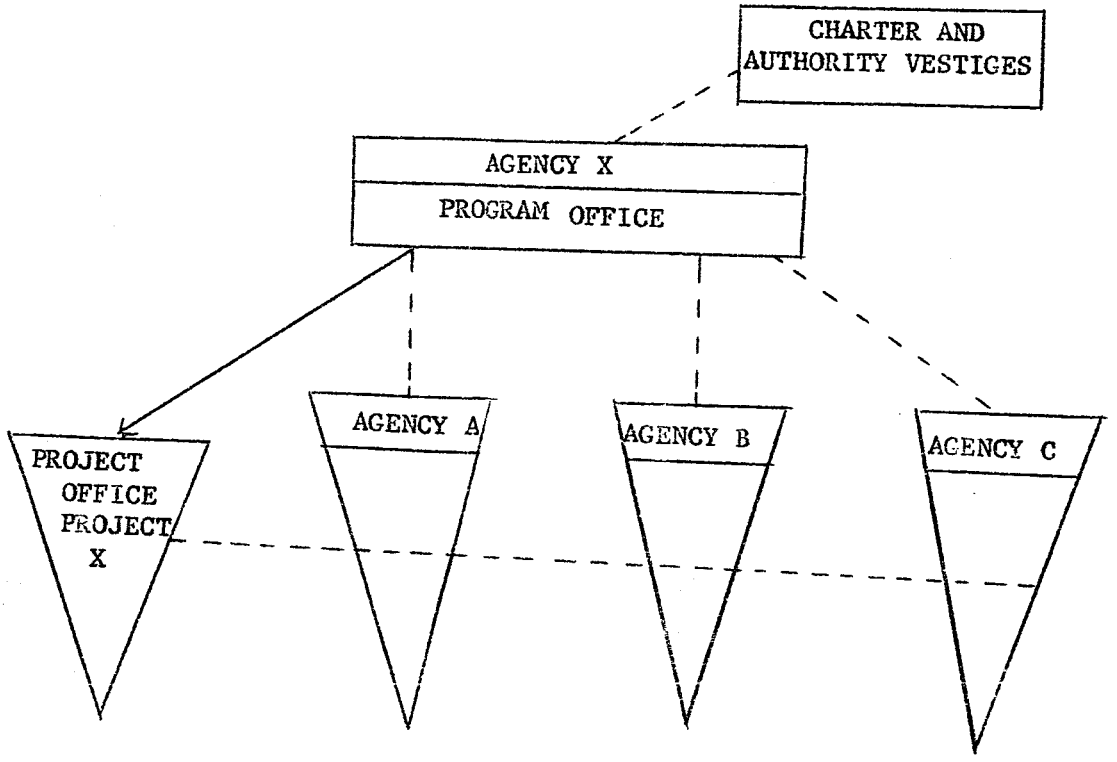

Figure 2 -- Matrix Model

the governmental agency would not have to "get into the business" which would save the agency from making large capital expenditures for accomplishing the objectives of the project.

As mentioned, there are numerous models which can be utilized. The ones suggested here are only a few of the basic arrangements which can be considered.

Emerging Requirements for Project Management Leadership

Now that we have viewed some of potential problem areas that may warrant a project management approach, it is now necessary to ask what type of leadership requirements will be necessary for managing these complex sociotechnical projects. It is difficult to say specifically that these skills are needed or that those characteristics are required. The leadership styles will likely depend upon the type of project, how it is organized, and the environment of the particular project. Nevertheless, one can delineate some of the "patterns" of leadership required for managing these complex sociotechnical problem areas. I believe Howard Johnson, the President of Massachusetts Institute of Technology, may have identified in part the emerging leadership style of tomorrow when he said:

> I believe that for managers of future organizations, the need for reshuffling of human resources, the emphasis on organic versus organizational solutions to problems, and the need to reorder priorities rapidly, amid-stream as it were, will require a special agility, and a competence to manage ambiguity and change. Above all, these conditions will require a transferability of management skills, from one task to another.[13]

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[13]Howard W. Johnson, "Management for a New Environment," The Conference Board Record, March, 1968, pp. 23-24.

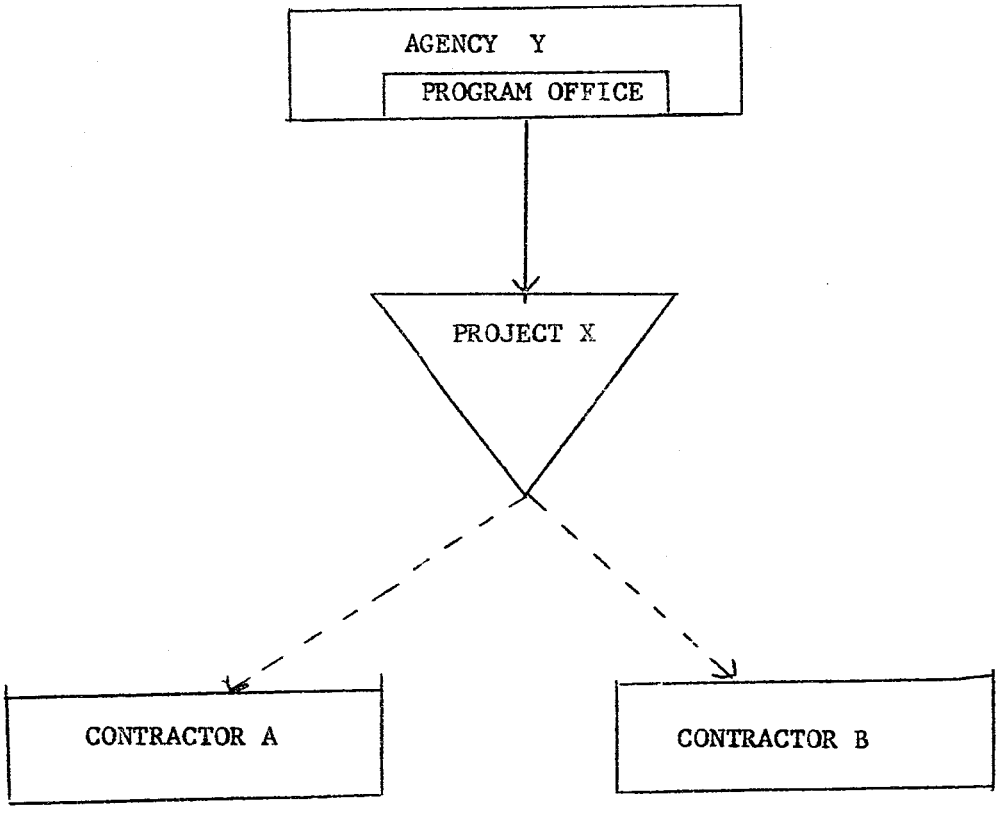

Figure 3 -- Program Management via Contractor Support

Bennis has also alluded to a new concept of leadership. His basic model finds its rationale in the role of the leader rather than in any particular knowledge that he may have. This new role "is to build a climate where growth and development are culturally induced"[14] To build this "climate" the leader needs the following skills:

1. Knowledge of large, complex human systems.
2. Practical theories of intervening and guiding these systems, theories that encompass methods for seeding, nurturing and integrating individuals and groups.
3. Interpersonal competence, particularly the sensitivity to understand the effects of one's own behavior on others and how one's own personality shapes his particular leadership style and value system.
4. A set of values and competencies which enables one to know when to confront and attack, if necessary, and when to support and provide the psychological safety so necessary for growth.[15]

In addition to the characteristics of this new leadership given by Bennis and President Howard Johnson of M.I.T., I believe that there will be additional leadership requirements that the sociotechnical project manager must possess. It appears imperative that the new generation of project managers must also:

1. Be advocates of "free form" management. This implies that the project operation and structure are dictated by the problem -- and not vice-versa. He must know that project management is only a means and not an end. This must also apply to the various planning and control systems he may use.

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[14]Warren G. Bennis, "Post-Bureaucratic Leadership," Transaction, July--August, 1969, p. 51.

[15]Ibid., pp. 51, 61.

2. Be cognizant of the environment in which his project operates. He must be able to distinguish between social problems and engineering problems and that many of the sociotechnical areas require resolution by both social and engineering approaches. Further, he must be able to accept that there may be several solutions to the sociotechnical problems.
3. Be clear on the nature, scope and importance of his project's charter. The project charter should clearly delineate his authority, his responsibilities, and the project's objectives. He will use the goals of the project as a planning guide for the project and as a control device to audit the performance of his project.
4. Be able to possess a tolerance for ambiguous problem situations. The degree of ambiguity appears to increase as projects move from the technical area to the more loosely structured and ill-defined sociotechnical areas.
5. Be a leader and perceive his role as planner, coordinator, and controller of the project. He must be able to ward off the detrimental influencers, especially the political influencers, who may attempt to alter or change the project's objectives. In short, he must truly be the general manager of his project.
6. Be cognizant of the importance of developing his own team. The project manager in the sociotechnical areas must surround himself with the best human resources available. He will depend upon "synergism" as a force in building a viable project team. The nature of the problem will be the chief determinant of his teams' professional input.

7. Be able to accept the constant challenge of change. All projects are characterized by evolution. This will be especially true of projects in the sociotechnical areas.
8. Be aware of and able to use the potentially powerful management systems which have been developed in other areas regardless of their origin. He will use them only when needed and where they serve a legitimate and justified purpose. He should be aware of the dangers of becoming too enamoured with management systems.

Enter the Professional Project Manager

The time is near when we shall see that the position, "professional project manager," will be a rather common role within many of our complex organizations. We have had professionals managing technical projects for many years. These managers have been our first generation of project managers. The second generation of project managers will not only be a "professional" in at least one discipline, but will also have the ability to have a multidisciplined appreciation. In addition, proven ability in the management of complex tasks will also be among their credentials. Consequently, this new breed of project manager will have much to offer to the sociotechnical areas. These men will be able to satisfy the ever increasing demands for specialization while concurrently offering the integrative ability of the effective executive.

We will undoubtedly see this new type of project manager shifting from one project to another as a project is completed and his skills are needed for another program. In the past, project managers have transferred their skills from one kind of project to another. But, the new

type of manager will be able to drastically shift problem emphasis, i.e., some of the best ones may be able to shift from the management of a research and development engineering project to projects in the socio-technical areas. His key in these transitions will depend heavily upon his ability to muster the "right team" for each project. He will be extremely adept at perceiving the "environmental mix" within which he will operate. It will not be necessary for him to be an expert in each area he tackles, but he will be an expert in managing complex projects.

SUMMARY

In the future we shall see many changes, in the way project management and project managers are utilized in problem-solving. To summarize the focus of this discussion, we shall see the following evolutionary changes in the near future:

1. A realization that project management and systems management are viable and acceptable management alternatives to managing various sociotechnical problem areas.
2. The thinking regarding the management styles of project managers will extend far beyond the simplistic notions of management by "Theory X" or "Theory Y" or whether project managers should use a "tight rein" or a "loose rein." Rather, much emphasis will be directed toward how project managers perceive and respond to cues in their environment and from their project team participants. Effective skills in these areas will be basic requirements for this new generation of project managers.
3. Project managers participating in the solution of the socio-technical areas will be some of the highest motivated managers

we have known. They will be required to develop a "holistic" view of their functions. Both the project manager and his team members will experience maximum participation in their roles.

4. A realization that project management is a fully acceptable and dynamic career, individuals will be highly trained for the position. This training process should make this new breed of managers far more effective than our present methods of training and selection have been.

In conclusion, project management and systems management offer potentially powerful tools for managing the burgeoning sociotechnical problems in society. These powerful management systems are not claimed to be panaceas for all our ills, simply that they are steps in the right direction. In recent years much has been said about the spin-offs and transfers from NASA's space program. Perhaps this paper can best be summarized as follows:

> Ever since the space program began to take shape there has been talk of technological spin-offs. It may turn out that the most valuable spin-off of all will be human rather than technological: better knowledge of how to plan, coordinate, and monitor the multitudinous and varied activities of the organizations required to accomplish great social undertakings.[16]

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[16]Dael Wolfle, Ibid.